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12/16/2008 04:04 PM

To Daniel Wall, "'Victoria Warren'"

cc

bcc

Subject West Lake Landfill OU-2 RD Work Plan

3 attachments

12-16-08 Bridgeton OU-2 Remedial Design Work Plan Text, Tables.pdf

12-16-08 Bridgeton OU-2 Remedial Design Work Plan Figures.pdf

12-16-08 Bridgeton OU-2 Remedial Design Work Plan Appendices.pdf

Attached is the West Lake Landfill Operable Unit 2 Remedial Design Work Plan developed by Herst & Associates, Inc. and CEC, Inc. on behalf of Laidlaw Waste Systems, Inc. Hardcopies will be submitted via overnight courier to USEPA and MDNR.

Thank you for your time and attention.

Ward Herst, Managing Director
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Remedial Design Work Plan

West Lake Landfill Site
Operable Unit 2 (OU-2)
Bridgeton, Missouri

December 2008

Civil & Environmental Consultants, Inc.

HERST & ASSOCIATES, INC.®

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1.0 INTRODUCTION

This Remedial Design Work Plan (Work Plan) for West Lake Landfill Operable Unit 2 (OU-2) has been prepared by Herst & Associates, Inc. (Herst) and Civil & Environmental Consultants, Inc. (CEC) (the project team). This Work Plan and the associated documents have been prepared by the project team on behalf of Bridgeton Sanitary Landfill, LLC (the Respondent) to the Administrative Order on Consent (AOC) for OU-2.

This Work Plan and the associated documents including the Quality Assurance Project Plan (QAPP), Sampling and Analysis Plan (SAP), and Health and Safety Plan (HSP) have been prepared by the project team in accordance with the requirements of the Third Amendment to the AOC and the associated Statement of Work (SOW) which describe the requirements for completion of the remedial design (RD) phase of the implementation of the selected remedy for OU-2. A description of the various components, design criteria, and performance standards of the selected remedy are provided in this Work Plan. The project planning activities, additional design investigations, and progress reporting to be conducted in support of the design of the selected remedy are also described.

1.1 Purpose and Scope

This Work Plan describes the activities to be completed in conducting the additional site investigations and testing necessary to support the design of the remedy. It also includes the project planning documents required for conducting these investigations. A preliminary conceptual design of the selected remedy and description of the performance standards that apply to the remedy are also presented in this Work Plan.

The requirements of other environmental regulations determined to be applicable or relevant and appropriate to the design and implementation of the remedy are included. In addition, this Work Plan presents preliminary design criteria upon which the RD will be based.

1.2 Organization

This Work Plan includes the following sections:

1.0 Introduction
2.0 Remedy Description
3.0 Design Team Composition
4.0 Design Investigations
5.0 ARARs Identification
6.0 Conceptual Design and Design Criteria
7.0 Progress Reporting
8.0 Project Schedule for RD

This Work Plan also includes the following appendices, some of which may be in separate volumes:

Appendix A: Conceptual Design Drawings
Appendix B: Photographs of Current Conditions at OU-2
Appendix C: Quality Assurance Project Plan (QAPP)
Appendix D: Sampling and Analysis Plan (SAP)
Appendix E: Health and Safety Plan (HSP)

2.0 REMEDY DESCRIPTION

The remedy will be designed to meet the performance standards, criteria and specifications set forth in the OU-2 Record of Decision (ROD), this SOW and the AOC, unless subsequently modified in accordance with the procedures set forth in the AOC.

The performance standards, criteria and specifications will include the substantive requirements set forth in applicable or relevant and appropriate requirements (ARARs) identified in Section 13.2 of the ROD.

2.1 Description of the Selected Remedy

The remedy for OU-2 was developed to protect human health and the environment by providing containment with relevant and appropriate closure and post-closure care requirements for the landfilled waste materials. The containment and post-closure care methods prevent human receptors from contacting the waste material and control contaminant migration to air or groundwater and include:

- Install landfill cover meeting the Missouri closure and post-closure care requirements for sanitary landfills.
- Apply groundwater monitoring and protection standards consistent with requirements for sanitary landfills.
- Surface water runoff control.
- Landfill Gas Monitoring and Control consistent with sanitary landfill requirements as necessary.
- Institutional Controls to prevent land uses that are inconsistent with a closed sanitary landfill site.
- Long term surveillance and maintenance of the remedy.

2.2 Performance Standards for the Selected Remedy

The Respondents will design the remedy to meet the performance standards and specifications set forth in the OU-2 ROD and the SOW. The performance standards for the major components of the remedy are identified below. Alternative standards or requirements may be approved if it can be demonstrated that the alternative design is at least equivalent in performance.

2.2.1 Landfill Cap

The landfill cover system will be designed to meet, at a minimum, the State of Missouri closure requirements for sanitary landfills. Consistent with the OU-2 ROD, these requirements are identified below:

- The Missouri Department of Natural Resources (MDNR) rules for sanitary landfill caps are in 10 CSR 80-3.010(17). These rules require that the final cover shall consist of at least two feet of compacted clay with a coefficient of permeability of $1x10^{-5}$ cm/sec or less and overlaid by at least one foot of soil capable of sustaining vegetative growth. The minimum sloping requirement of 5% need not be met in this case; however, the design shall include provisions

for slope stability and optimize the need to promote runoff and minimize the potential for erosion. The maximum sloping requirement of 25% will be met unless the stability of steeper slopes can be demonstrated; however, in no case will the slopes exceed 33 1/3%.

- The design will incorporate plans for decomposition gas monitoring and control consistent with 10 CSR 80-3.010(14).

2.2.2 Groundwater Monitoring

The RD will provide for the design and implementation of a long-term groundwater monitoring program. The groundwater monitoring program will include the collection of data necessary to track the movement and direction of flow of the groundwater and to monitor changes in chemical constituents and chemical concentrations in the groundwater over time. The monitoring plans will include specific monitoring objectives, monitoring locations, data quality objectives, sampling frequencies and procedures, and analytical parameters and methods. The plans will describe the approach to data evaluation and trend analysis. The monitoring program will be designed to meet the objectives in OU-2 ROD Section 12.2.1 and will be consistent with the monitoring requirements and groundwater protection standards found in the Missouri Solid Waste Rules for Sanitary Landfills [10 CSR 80-3.010 (11)].

2.2.3 Surface Water Runoff Controls

Surface water runoff controls may include surface water diversion channels, inlet structures, underground conveyance systems, and surface water detention basins. These features will be designed to accommodate the 24-hour, 25-year storm as required by the MDNR Solid Waste Regulations (10 CSR 80-3.010(8)(B)1.F.(III) and as may be required by the Missouri Clean Water Law and corresponding rules and the state National Pollutant Discharge Elimination System (NPDES) permit for the Site.

2.2.4 Landfill Gas Monitoring and Control

Characterization of landfill gas occurrences and concentrations will be conducted as part of the Remedial Design investigations. The MDNR Solid Waste Regulations [10 CSR 80-3.010(14)(C)(2)B.] state that decomposition gases shall not be allowed to concentrate above 50% of the lower explosive limit (LEL) or 2.5% by volume for methane in the soil at the property boundary of a sanitary landfill. In the event that landfill gas occurs, or may reasonably be expected to occur after construction of the new landfill cover, at levels greater than those allow by the MDNR Solid Waste Regulations, then an active or passive landfill gas control system will be installed. Regardless of whether a landfill gas control system is installed, permanent landfill gas monitoring probes will be installed along the property boundary portions of Areas 1 and 2 after construction of the new landfill cover to provide for ongoing monitoring of landfill gas in the future.

2.2.5 Institutional Controls

The RD will provide for the design and implementation of institutional controls meeting the land and resource use requirements and objectives identified in the OU-2 ROD Section 12.2.2.

2.2.6 Surveillance and Maintenance

The RD will provide for surveillance and maintenance of the remedy. Plans will be developed describing the procedures for inspection and maintenance of engineering controls, access controls and monitoring structures. Plans will also address procedures for maintenance, inspection and enforcement of land and groundwater use restrictions.

3.0 DESIGN TEAM

The RD team is composed of two engineering and environmental firms including:

- Herst & Associates, Inc. (Herst)
- Civil & Environmental Consultants, Inc. (CEC)

Herst will serve as the Supervising Contractor and will provide overall project management and technical direction to the project. Mr. Ward Herst will serve as the Project Coordinator. Having previously been responsible for the Remedial Investigation (RI) and Feasibility Study (FS) for OU-2, Herst personnel are completely familiar with the various aspects of the project. Herst will be responsible for the following RD activities:

- Identification of the various technical requirements of the project, assignment of project tasks to the various members of the project team, development and tracking of project schedules and budgets and review and approval of project deliverables;
- The overall Quality Assurance of the project and will provide the project Quality Assurance Officer;
- Preparation of this RD Work Plan;
- Coordination of the development of design criteria;
- Development of the Institutional Controls Plan for OU-2;
- Coordination and preparation of the Preliminary Design submittal;
- Coordination and preparation of the Intermediate Design submittal (if necessary);
- Coordination and preparation of the Pre-Final Design submittal;
- Coordination and preparation of the Final Design submittal;
- Coordination and preparation of the O&M Plan;
- Coordination and preparation of the Contingency Plan;
- Preparation of the Community Relations Plan; and
- Preparation of monthly project status reports to EPA and for scheduling and coordination of all meetings and interactions with EPA and MDNR.

Civil & Environmental Consultants, Inc. will provide design services and will be responsible for development of the RD drawings and specifications. CEC has extensive experience designing and permitting solid waste landfills and Subtitle D covers similar to that required for OU-2. CEC has previously worked with Herst & Associates on other landfill associated projects. CEC will be responsible for the following RD activities:

- Supervision of RD site surveying and base map development;
- Identification and geotechnical testing of potential construction materials (rock, low permeability layer and vegetative layer);
- Development of grading and cut and fill plans for waste relocation (if needed);
- Design and preparation of the construction drawings and specifications for the landfill cover;
- Design and preparation of the construction drawings and specifications for the surface water runoff control system;
- Design and preparation of the construction drawings and specifications for the landfill gas control system (if necessary);
- Preparation of the Construction Quality Assurance (CQA) Plan;
- Preparation of a construction schedule; and
- Preparation of construction cost estimate.

Herst will also be responsible for the following RD activities:

- Preparation of the QAPP, SAP, and the HASP included with this Work Plan;
- Conducting the additional site investigations required to support the RD;
- Installation and testing of landfill gas probes to assess the presence and extent of occurrences of landfill gases along the outer (property) boundaries of Inactive Sanitary Landfill;
- The health and safety program during performance of the design investigations;
- Design of the environmental monitoring (groundwater, stormwater, and landfill gas) program portion of the RD;
- Preparation of the construction Field Sampling Plan; and
- Preparation of the Spill Prevention, Control and Countermeasure Plan portion of the Contingency Plan.

Figure 3-1 presents an organization chart for the project team that will implement the RD, specific personnel to be involved with the RD, and the generalized lines of communication and responsibility.

4.0 DESIGN INVESTIGATIONS

Most of the site characterization was completed as part of the RI (Herst, 2005) and supplemental investigations completed in conjunction with the FS (Herst, 2006); however, some additional data are needed to prepare the RD. The additional data needed to complete the RD include the following:

1. During the RD, a more detailed ground survey will be conducted, with the goal of yielding ground surface elevations accurate to with 0.25 feet throughout the Inactive Sanitary Landfill that comprises OU-2. The ground survey will be combined with a more recent aerial flyover and photography to provide the level of detail sufficient for calculating necessary material volumes to achieve planned final grades. Field activities associated with the topographic survey will include, but not necessarily be limited to, surveying ground surface elevations and, if possible, establishing the routing and discharge points of the existing surface water controls;

2. Nature and concentration of explosive gases, if any, that are coincident with the landfill property boundaries to determine if landfill gas is present at levels above 50% of the lower explosive limit (LEL), which is equivalent to 2.5% methane by volume, such that a landfill gas control system will be required;

3. Cover thickness testing and geotechnical testing (Atterberg Limits, grain size distribution and permeability) will be performed during the RD. Sampling of existing cover materials will be conducted to evaluate cover thickness and assess selected geotechnical soil properties. These evaluations will provide an estimate the volume of materials needed for construction of the final cover and the suitability of using the existing material as landfill cover;

4. The existing slope along the western perimeter of OU-2 was established in the mid-1990's. Based on observations during a site walkover conducted by the Landfill Design team on November 11, 2008, the existing slope appeared to be stable. One of the RD tasks is to further document the history and stability of the existing slope. To meet this objective, a series of thirteen (13) survey pins will be installed in the western slope. These pins will be surveyed on a monthly basis during the RD phase to document movement and stability of the slope. If additional documentation of slope stability is warranted, an on-site biological assessment of existing vegetation along the western slope or a geotechnical sampling investigation may be implemented.

5. As part of the RD, soil samples will be collected from each of three potential borrow areas with laboratory testing conducted on potential sources of low-permeability final cover soils. Representative bulk soil samples will be collected from test pits excavated in each of the proposed borrow areas. The testing program will included natural moisture content, Atterberg Limits, Standard proctor dry density determination, and recompacted permeability. The resultant data are needed for approval of the borrow soils before construction and will be identified in the Remedial Action construction specifications that are developed following completion of the RD phase of this project;

6. Groundwater monitoring activities will be conducted during the RD to collect one round of groundwater samples from existing, previously-monitored monitoring wells. The purpose of these activities is to provide a groundwater quality data set between the completion of the RI/FS monitoring activities and the start of the Remedial Action groundwater monitoring activities.

7. Several issues were noted during the site walkover performed on November 11, 2008 and will also need to be investigated as part of the RD. Photographs from the site walkover are provided in Appendix B. Issues requiring further investigation include the following:

   - Presence of apparent stormwater "drains" on the west slope that drain stormwater trapped in the channel. It is uncertain where the conveyances discharge and one of the two was covered and not recognizable on the day of the visit.

   - There are several existing leachate/groundwater wells at the OU-2 site that will need to be abandoned.

   - There are two concrete standpipes that rise approximately 20 feet above the ground surface on the west side of OU-2. It is uncertain what these structures were designed for or if they will be needed long-term at the site.

   - There are fiber optic lines at the base of the steep west slope that may need addressed depending on the design of the cap.

   - The leachate pumping system at the southeast corner of the site also requires additional investigation. Discussions will need to be coordinated with MDNR/USEPA to determine whether continued pumping of leachate will be required based on previous leachate characterization details.

More detailed information and drawings regarding the sampling and analysis protocols, data needs and data quality objectives for the RD investigations are presented in the SAP and QAPP which are provided as Appendix C and Appendix D to this Work Plan, respectively.

5.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

This section describes the ARARs or other regulations as identified in Section 13.2 of the ROD for OU-2.

5.1 Missouri Solid Waste Rules for Sanitary Landfills

Missouri is an EPA-approved state for providing regulations for landfills under the Resource Conservation and Recovery Act Subtitle D. Missouri promulgated its regulations (22 Mo Reg 1008, June 2, 1997) as the Missouri Solid Waste Rules which became effective July 1, 1997. The Missouri Solid Waste Rules establish closure and post-closure requirements for existing sanitary landfills that close after October 9, 1991. Although not applicable to the closure of OU-2, the requirements described below are considered relevant and appropriate and therefore will be met.

The MDNR regulations require cover to be applied to minimize fire hazards, infiltration of precipitation, odors and blowing litter, control gas venting and vectors, discourage scavenging, and provide a pleasing appearance [10 CSR 80-3.010(17)(A)]. The regulations require final cover consisting of at least two feet of compacted clay with a coefficient of permeability of 1 x 10-5 cm/sec or less overlaid by at least one foot of soil capable of sustaining vegetative growth [10 CSR 80-3.010(17)(C)(4)]. These requirements are considered to be design criteria for the RD for OU-2. Placement of this final soil cover addresses the requirements for minimization of fire hazards, odors, blowing litter, control of gas venting, and scavenging. Placement of clay meeting the permeability requirement addresses the requirement for minimization of infiltration of precipitation. Placement of soil and establishment of a vegetative cover meet the requirement of providing for a pleasing appearance.

The MDNR landfill regulations also contain minimum and maximum slope requirements. Specifically, these regulations require the final slope of the top of the sanitary landfill shall have a minimum slope of five percent [10 CSR 80-3.010(17)(B)(7)]. MDNR regulations also require that the maximum slopes be less than 25 percent unless it has been demonstrated in a detailed slope stability analysis that the slopes can be constructed and maintained throughout the entire operational life and post-closure period of the landfill. Even with such a demonstration, no active, intermediate, or final slope shall exceed 33 1/3 percent. The objective of these requirements is to promote maximum runoff without excessive erosion and to account for potential differential settlement. Because the landfilling of OU-2 was completed over 30 years ago, most compaction of the refuse has taken place and differential settlement is no longer a significant concern. The five percent minimum sloping requirement is greater than necessary and may not be optimal in this case. Therefore, the five percent minimum sloping requirement is not considered appropriate. Sloping specifications would be designed to promote drainage and reduce infiltration of precipitation while minimizing the potential for erosion. It is anticipated that a two percent slope would be sufficient to meet drainage requirements while resulting in a lower potential for erosion or slope failure. This approach should increase the life of the cover and overall longevity of the remedy compared to a steeper slope which would be subject to increased erosion potential. The 2% minimum slope and 25% maximum slope (or alternatively up to a 33 1/3% maximum slope as supported by a geotechnical evaluation) will be included as design criteria in the RD and therefore the minimum and maximum sloping requirements of the MDNR regulations will be met. These requirements may need to be looked at for the disturbed area only. The existing Western slope exceeds these requirements, but as described above appears to be stable by observation. This slope would cause more harm than leaving the slope intact.

The requirements for decomposition gas monitoring and control in 10 CSR 80-3.010(14) are considered relevant and appropriate and will be met. The number and locations of gas monitoring points and the frequency of measurement are described in detail in the attached QAPP and SAP. In

the event landfill gas is detected at the landfill boundaries above the regulatory thresholds during the RD investigations, a landfill gas control system will be included as part of the RD.

The requirements for a groundwater monitoring program in 10 CSR 80-3.010(11) are considered relevant and appropriate. A groundwater monitoring program capable of monitoring any ongoing or potential impact of the landfill on underlying groundwater will be developed as part of the RD.

The substantive MDNR landfill requirements for post-closure care and corrective action found in 10 CSR 80-2.030 are also considered relevant and appropriate. These substantive provisions provide a useful framework for O&M and corrective action plans and require post-closure plans describing the necessary maintenance and monitoring activities and schedules. These requirements will be used in addition to EPA CERCLA policy and guidance on developing robust O&M and long-term monitoring plans. These requirements will be addressed in the development of an O&M Plan to be prepared as part of the RD.

5.2 National Ambient Air Quality Standards

The National Ambient Air Quality Standards (NAAQS) contain standards that apply to six criteria pollutants as established under the current federal law (40 CFR 50). These standards are designed to establish maximum exposure limits that are protective of human health and the environment. Since the remedy for OU-2 will involve grading, compaction, and other soil-related activities, NAAQS for PM_{10} are potentially relevant and appropriate requirements during implementation of the Remedial Action. As a result, perimeter air monitoring may be conducted during implementation of the RA at OU-2. Site health and safety plans will address protection of on-site personnel.

5.3 Clean Water Act

The Clean Water Act sets standards for ambient water quality and incorporates chemical specific standards including federal water quality criteria and state water quality standards. The substantive requirements for storm water runoff are relevant and appropriate. Therefore, these standards will be identified in the stormwater monitoring plan and will be used as performance standards to evaluate the results of the stormwater monitoring.

5.4 Safe Drinking Water Act

The 40 CFR part 141 establishes primary drinking water regulations pursuant to section 1412 of the Public Health Service Act, as amended by the Safe Drinking Water Act (Public Law 93-523) and related regulations applicable to public water systems. These MCLs apply to public drinking water systems. Missouri regulations (10 CSR 60-4.010, et seq) also establish MCLs for public drinking water systems. Consistent with the NCP, MCLs are considered relevant and appropriate to all potentially usable groundwater. Therefore, the MCLs will be identified in the groundwater monitoring plan and will be used as performance standards to evaluate the results of the groundwater monitoring.

5.5 Missouri Well Construction Code

MDNR has promulgated regulations pertaining to the location and construction of water wells. The Well Construction Code (10 CSR 23-3.010) prohibits the placement of a well within 300 feet of a landfill. These rules should provide protection against the placement of wells on or near the Site and will be incorporated into the Institutional Controls Plan for the Site.

MDNR has also established on monitoring well construction (10 CSR 23-4) that will apply to the construction of new or replacement monitoring wells at the Site.

6.0 CONCEPTUAL DESIGN AND DESIGN CRITERIA

The solid waste materials in OU-2 will be regraded, where required to meet the minimum and maximum slope requirements established by the MDNR solid waste regulations as discussed above and then will be covered with a landfill cover that meets the MDNR solid waste requirements. The final cover for OU-2 will consist of a minimum of 2-ft of clay, silt, or sandy clay compacted to a density that should result in a factor of permeability for this layer of 10-5 cm/sec. This low permeability layer in turn will be overlain by a minimum of 1 ft of uncompacted soil suitable to support development of grassy vegetation.

6.1 Conceptual Design

The design team has developed preliminary grading plans for the regraded landfill cover (Appendix A, **Figure A-1**) that meet the minimum and maximum slope requirements of the MDNR Solid Waste Regulations for the area to be disturbed in creating the final closure cap. The proposed regrading plan was developed based on the 2005 general topographic elevations of the landfill surface which may not accurately reflect current conditions. The proposed regrading plan was also developed based on trying to limit the amount of fill by locating areas within OU-2 that currently have more volume than needed for the selected remedy

It is anticipated that regarding of the waste surface will be minimal. This will be achieved only if the existing western slope can be maintained in its current condition. If in fact this slope needs to be cut back, significant regrading of waste will be required.

6.2 Design Criteria

The design criteria to be used as a basis for the design of the remedy were identified based on the requirements of the ARARs presented in Section 5 above and based on professional engineering judgment. The design criteria and the basis of the design criteria are summarized in **Table 6-1**.

7.0 PROGRESS REPORTS

On behalf of the Respondents, Herst will continue to prepare and submit monthly progress reports by the 10th day of each following month. These progress reports will include the following items:

1. A description of the actions taken during the prior month to comply with the AOC;

2. Copies of analytical data received by the Respondents during the prior month;

3. A description of the work planned for the next two months; and

4. A description of all material problems encountered and any anticipated material problems, as well as actual or anticipated material delays and solutions developed and implemented to address any actual or anticipated material problems or delays.

Progress reports will be submitted to the EPA Remedial Project Manager (RPM) by mail with a copy provided to the MDNR project manager.

8.0 PROJECT SCHEDULE FOR REMEDIAL DESIGN

Figure 8-1 presents anticipated start dates, durations and a critical path schedule for the various RD activities. The actual schedule may be affected by weather conditions during performance of the RD site investigations, the possible need for follow-up investigations based on the results of the proposed investigations, and the actual length of agency review periods.

9.0 REFERENCES

Golder Associates, Inc., Draft Report – Inactive Sanitary Landfill Cap Investigation, West Lake Site, August 25, 1995.

Herst & Associates, Inc., Remedial Investigation Report, West Lake Landfill Operable Unit 2, September, 2005.

Herst & Associates, Inc., Feasibility Study Report, West Lake Landfill Operable Unit 2, June, 2006.

Missouri Department of Natural Resources (MDNR), Landfill Closure Guidance, Publication 187, July, 2003.

U.S. Environmental Protection Agency (EPA), Third Amendment to Administrative Settlement Agreement and Order on Consent in the Matter of Bridgeton Landfill, LLC, Docket No. VII-94-F-0025, October 16, 2008.

U.S. EPA, Record of Decision, West Lake Landfill Site, Bridgeton, Missouri Operable Unit 2, July, 2008.

TABLES

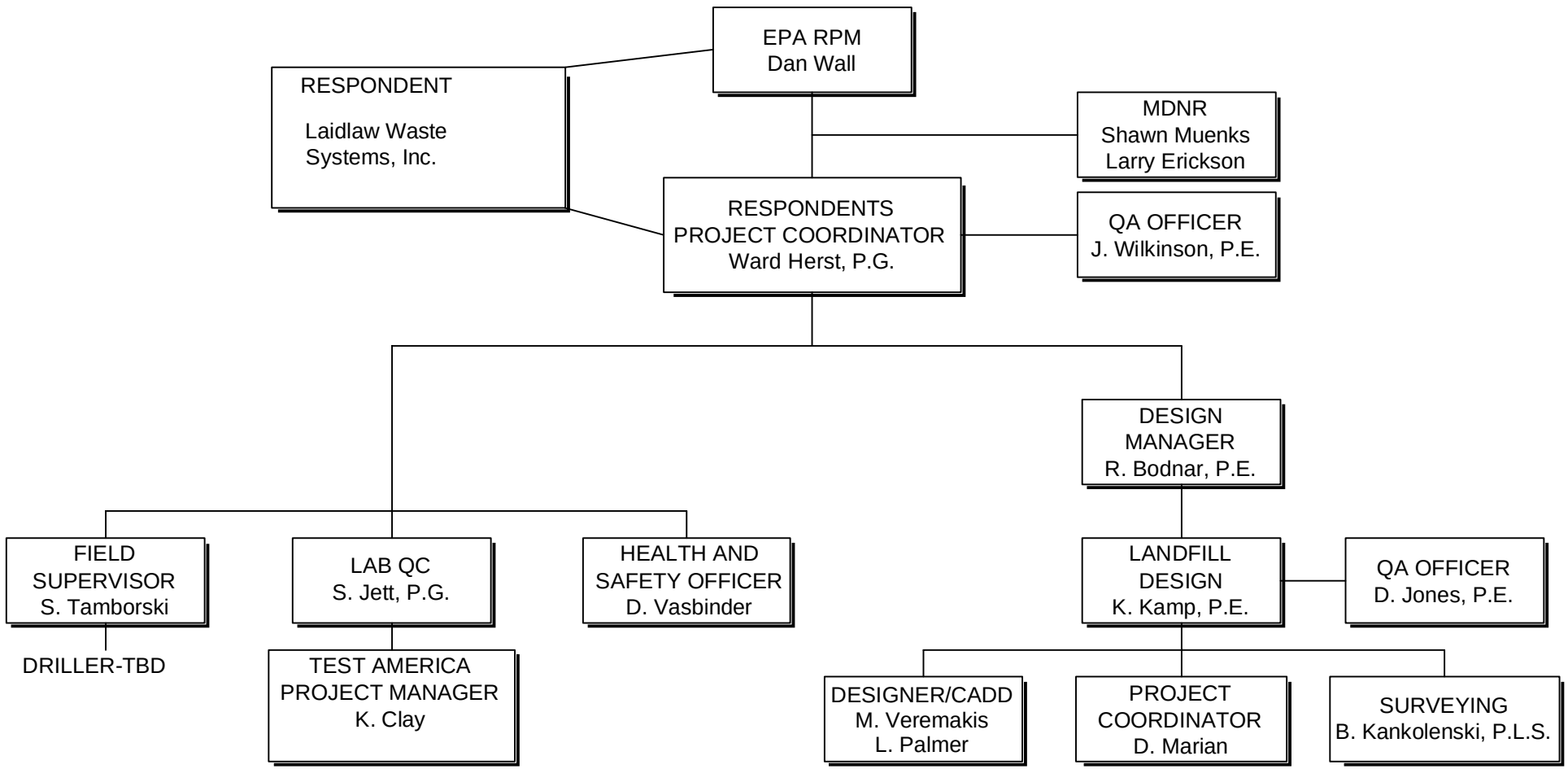
Table 6-1
Design Basis and Design Criteria
West Lake Landfill OU-2

Parameter or Criteria	Design Basis	Design Criteria
Final Landfill slopes	MDNR Solid Waste Regulations 10 CSR 80-3 (17) (B) 7 and 8 and (C) 3 and the Record of Decision	Minimum 2% Maximum 25% (or 33 1/3% subject to a geotechnical investigation of slope stability)
Landfill Cover		
Rock Layer	Record of Decision	2 ft of 8" minus pit run quarry rock (limestone)
Low permeability layer	MDN Solid Waste Regulations 10 CSR 80-3 (17) (C) 4 A	2 ft of compacted clay, silt or sandy clay with a permeability of 1 x 10^{-5} cm/sec or less
	Radon NESHAP 40 CFR 61 Subpart T	Rn-222 emissions should not exceed 20 pCi/m^2s on average
Vegetative layer	MDNR Solid Waste Regulations 10 CSR 80-3 (17) (C) 4 A	1 ft minimum of soil capable of sustaining vegetative growth
Landfill Gas		
Decision as to whether a landfill gas system is necessary	MDNR Solid Waste Regulations 10 CSR 80-3 (14) (C) 2 B	Landfill decomposition gases shall not be allowed to concentrate above 50% of the LEL or 2.5% by volume of methane in soil at the property boundary
Design of a landfill gas system, if necessary	MDNR Solid Waste Regulations 10 CSR 80-3 (14)	Identifies the specific requirements for design of a landfill gas control system.

Table 6-1
Design Basis and Design Criteria
West Lake Landfill OU-2

Parameter or Criteria	Design Basis	Design Criteria
Stormwater	MDNR Solid Waste Regulations 10 CSR 80-3 (8) F	On-site drainage structures and channels shall be designed to collect at least the water volume resulting from a 24-hour, 25-year storm
Groundwater Monitoring		
	MDNR Solid Waste Regulations 10 CSR 80-3 (11)	Identifies the specific requirements for design, implementation and operation of a groundwater monitoring program and for a solid waste landfill and establishes groundwater protection standards for landfill related constituents
	Missouri Well Construction Code 10 CRS 23-4	Specifies requirements for design and construction of groundwater monitoring wells

FIGURES



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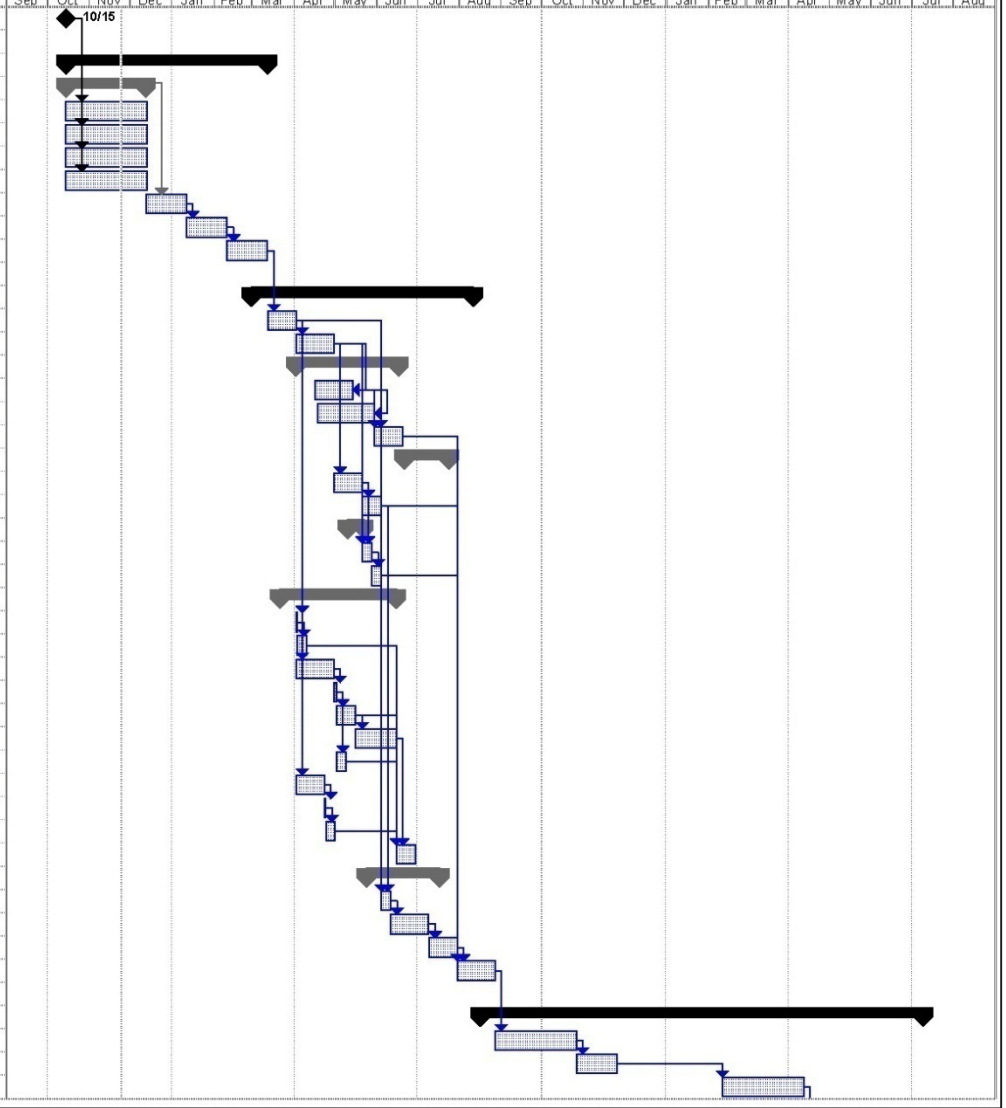
West Lake Landfill OU-2
Bridgeton, Missouri

Figure 3-1
Project Organization Chart

ID	Task Name	Duration	Start	Finish	Predecessors
1	**AOC Amendment No. 3**	0 days?	Wed 10/15/08	Wed 10/15/08	
2					
3	**RD Work Plan**	**108 days**	**Wed 10/15/08**	**Thu 3/12/09**	
4	Draft RD Work Plans	43 days	Wed 10/15/08	Fri 12/12/08	
5	Draft RD Work Plan	60 edays	Wed 10/15/08	Sun 12/14/08	1
6	Draft RD QAPP	60 edays	Wed 10/15/08	Sun 12/14/08	1
7	Draft RD SAP	60 edays	Wed 10/15/08	Sun 12/14/08	1
8	Draft RD HASP	60 edays	Wed 10/15/08	Sun 12/14/08	1
9	EPA review of Draft RD Plans	30 edays	Fri 12/12/08	Sun 1/11/09	4
10	Final RD Work Plans	30 edays	Sun 1/11/09	Tue 2/10/09	9
11	EPA review and approval of Final Plans	30 edays	Tue 2/10/09	Thu 3/12/09	10
12					
13	**Remedial Design Investigations**	**120 days**	**Sun 3/1/09**	**Tue 8/11/09**	
14	Contracting and Mobilization	21 edays	Thu 3/12/09	Thu 4/2/09	11
15	Clearing and grubbing	28 edays	Thu 4/2/09	Thu 4/30/09	14
16	Surveying	55 days	Fri 4/3/09	Wed 6/17/09	
17	Ground Surveying	28 edays	Thu 4/16/09	Thu 5/14/09	15FF+10 days
18	Aerial photography	42 edays	Sun 4/19/09	Sun 5/31/09	17FF+10 days
19	Base map preparation	21 edays	Sun 5/31/09	Sun 6/21/09	18,17
20	Landfill Gas Investigation	25 days	Mon 6/22/09	Fri 7/24/09	
21	Geoprobe soil gas sampling	21 edays	Thu 4/30/09	Thu 5/21/09	15
22	Summary of soil gas results	14 edays	Thu 5/21/09	Thu 6/4/09	21
23	Investigation Of Existing Clay Cap	10 days	Mon 5/11/09	Fri 5/22/09	
24	Geoprobe investigation	7 edays	Thu 5/21/09	Thu 5/28/09	15,21
25	Summary of geoprobe result	7 edays	Thu 5/28/09	Thu 6/4/09	24
26	Import Materials Testing	83 days	Sun 3/22/09	Mon 6/15/09	
27	Pit run material sampling	1 eday	Thu 4/2/09	Fri 4/3/09	14
28	Pit run material density testing	7 edays	Fri 4/3/09	Fri 4/10/09	27
29	Low perm material source id	28 edays	Thu 4/2/09	Thu 4/30/09	14
30	Low perm material sampling	2 edays	Thu 4/30/09	Sat 5/2/09	29
31	Low perm material compaction testin	14 edays	Sat 5/2/09	Sat 5/16/09	30
32	Low perm material perm testing	30 edays	Sat 5/16/09	Mon 6/15/09	31
33	Low perm material density testing	7 edays	Sat 5/2/09	Sat 5/9/09	30
34	Topsoil material source id	21 edays	Thu 4/2/09	Thu 4/23/09	14
35	Topsoil material sampling	1 eday	Thu 4/23/09	Fri 4/24/09	34
36	Topsoil material density testing	7 edays	Fri 4/24/09	Fri 5/1/09	35
37	Summary of materials testing	14 edays	Mon 6/15/09	Mon 6/29/09	28,31,32,33,36
38	Groundwater Monitoring	40 days	Mon 5/25/09	Fri 7/17/09	
39	Groundwater sample collection	7 edays	Thu 6/4/09	Thu 6/11/09	14,22,25
40	Groundwater sample analyses	28 edays	Thu 6/11/09	Thu 7/9/09	39
41	Groundwater analyses data review	21 edays	Thu 7/9/09	Thu 7/30/09	40
42	Data Evaluation Summary Report	28 edays	Thu 7/30/09	Thu 8/27/09	19,22,25,41
43					
44	**Remedial Design**	**235 days**	**Mon 8/17/09**	**Fri 7/9/10**	
45	Preliminary Design Report	60 edays	Thu 8/27/09	Mon 10/26/09	42
46	EPA Review of Prelim Design Report	30 edays	Mon 10/26/09	Wed 11/25/09	45
47	Pre-Final Design Report	60 edays	Fri 2/12/10	Tue 4/13/10	46



Project: Project1
Date: Mon 11/24/08

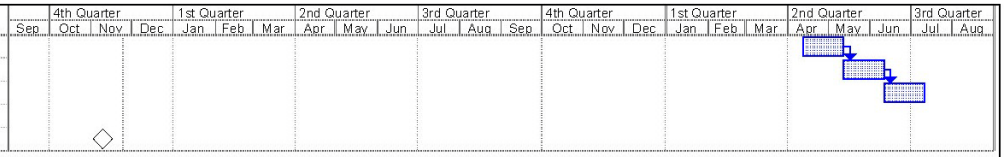
Critical
Critical Split
Critical Progress
Task
Split
Task Progress
Baseline
Baseline Split
Baseline Milestone
Milestone
Summary Progress
Summary
Project Summary
External Tasks
External Milestone
Deadline

Figure 8-1 Page 1 of 2)

Figure 2: Remedial Design Schedule - West Lake Landfill Operable Unit - 2

Draft - Subject to revision

ID	Task Name	Duration	Start	Finish	Predecessors
48	EPA Review of Pre-Final Design	30 edays	Tue 4/13/10	Thu 5/13/10	47
49	Final Design Report	30 edays	Thu 5/13/10	Sat 6/12/10	48
50	EPA Approval of Final Design	30 edays	Sat 6/12/10	Mon 7/12/10	49
51					
52	**Monthly Progress Reports**	**460 days**	**Mon 11/10/08**	**Tue 8/10/10**	



Project: Project1
Date: Mon 11/24/08

Critical
Critical Split
Critical Progress
Task
Split
Task Progress
Baseline
Baseline Split
Baseline Milestone
Milestone
Summary Progress
Summary
Project Summary
External Tasks
External Milestone
Deadline

Figure 8-1 (Page 2 of 2)

Figure 2: Remedial Design Schedule - West Lake Landfill Operable Unit - 2

Draft - Subject to revision

APPENDIX A

Conceptual Design Drawings

G:\PROJECTS\2008\081-926\DWG\081926-C000.DWG (LPALMER) - DEC 11, 2008 - 11:26:5

DESIGN INTENT IS TO MATCH GRADES PROPOSED WITH OU-1 REMEDY

LEGEND

- OU-2 BOUNDARY
- FINISHED GRADES — 480
- EX. LEACHATE WELL & PUMP
- EX. CONC. STAND PIPE
- PROPOSED STORM PIPE — ST
- PROPOSED ROCK SWALE

PROPOSED SURFACRE WATER INLET

PROPOSED SURFACE WATER MH

PROPOSED SURFACE WATER MH

NPDES OUTFALL 003

NORTH

SCALE IN FEET

0 200 400

PREPARED IN CONJUCTION WITH

HERST & ASSOCIATES, INC.®

Civil & Environmental Consultants, Inc.

4848 Park 370 Blvd., Suite F - Hazelwood, MO 63042

314-656-4566 · 866-250-3679

www.cecinc.com

WESTLAKE LANDFILL OU-2
13570 ST. CHARLES ROCK ROAD
BRIDGETON, MO 63044
ST. LOUIS COUNTY

CONCEPTUAL DESIGN PLAN

DRAWN BY:	LEP	CHECKED BY:	KTK	APPROVED BY:	*DFM	FIGURE NO.:	A-1
DATE:	DEC. 2008	DWG SCALE:	1"=200'	PROJECT NO:	081-926		

APPENDIX B

Photographs of Current Conditions at OU-2

Photo 1:

View of apparent stormwater collection drain (1 of 2) along west side of OU-2.

Photo 2:

View of apparent stormwater collection drain (2 of 2) that has been silted in along west side of OU-2.

Photo 3:

View of concrete standpipe (1 of 2) along west side of OU-2.

CEC
Civil & Environmental Consultants, Inc.

Photos of Current Conditions at OU-2
Photos taken 11/11/08
CEC Project No. 081-926

Photo 4:

View of leachate pumping well along east side of OU-2.

Photo 5:

View of fenceline along western slope of OU-2 (looking toward the south).

Photo 6:

View of fenceline along western slope of OU-2 (looking toward the northeast). Buried fiber optic cables run in a north-south direction beneath this area.

CEC
Civil & Environmental Consultants, Inc.

Photos of Current Conditions at OU-2
Photos taken 11/11/08
CEC Project No. 081-926

Photo 7:

View of stormwater retention pond to the west of OU-2 (looking toward the northwest).

Photo 8:

View of existing vegetative cover at OU-2 with soil stockpile in background (looking toward the north).

Photo 9:

View of soil stockpile along northern portion of OU-2.

CEC
Civil & Environmental Consultants, Inc.

Photos of Current Conditions at OU-2
Photos taken 11/11/08
CEC Project No. 081-926

APPENDIX C

Remedial Design Quality Assurance Project Plan
(in a separate volume)

APPENDIX D

Remedial Design Sampling and Analysis Plan
(in a separate volume)

APPENDIX E

Remedial Design Health and Safety Plan
(in a separate volume)